

Impact of Modern Technology on Agriculture Sector: A Case Study of District Pulwama

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Abstract

Agriculture plays a very prominent role for development of economy of J&K State. Nearly 70 per cent of the population in the state derives their livelihood directly or indirectly from agriculture sector. In the state of Jammu and Kashmir, 58 per cent of the area under agriculture is rain fed and remaining 42 per cent is irrigated. The traditional system of farming is in the process of transformation to modern agriculture which itself is undergoing through rapid changes. In this study an attempt has been made to examine the major advantages and disadvantages of modern technology on agriculture sector in the study area. It is found from the study that the major advantage of modern technology on agriculture is increase in farm productivity followed by time saving and increase in price and demand of products and the major disadvantage of modern technology on agriculture is increase in input cost followed by decreases employment opportunities and farmers are unable to use it.

Keywords: Agriculture, Advantages, Disadvantages, Technology, Irrigation

1. Introduction

Agriculture is the main means of sustenance of both developing and underdeveloped societies. The study of development and change in these societies seems to be the need of the day, especially in view of the fact that the majority of the world's population continues to live by

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agriculture. Today, despite of the powerful extraneous factors, agriculture continues to be the mainstay of most societies¹. India is predominantly an agrarian country with nearly 70 per cent of its population living in rural areas, nearly 60 percent of workforce being dependent directly and indirectly on agriculture and allied activities as the main occupation and a big proportion of rural households earning their subsistence from agriculture. Thus, there is a valid justification for giving attention towards development of agriculture for gaining high overall growth for the economy².

The traditional system of farming is in the process of transformation to modern agriculture which itself is undergoing through rapid changes. It has added a new dimension to agriculture. The role of credit in traditional agriculture is quite different from its role in modern agriculture³. The traditional agriculture is defined as subsistence farming in which production activities take place for their own consumption. In the modern agriculture, agricultural sector becomes fully commercialized and the farmer produces for the market with profit motive. It is the new technology and availability of new inputs that can transform traditional agriculture into modernized one. The new technology may be divided into two categories. One is depending on the chemical sources of energy and other one on mechanical sources of energy. Biochemical technology is “land augmenting” and “labour absorbing” in nature. It is based on the traditional element along with sufficient use of irrigation, fertilizers and HYV seeds. Mechanical technology is labour displacing in nature, displaces human and animal labour and make use of machines like tractors, threshers etc. Thus, the land augmenting technique has no size bias whereas mechanical technology has a size bias⁴.

Agriculture plays a very prominent role for development of economy of J&K State. Jammu and Kashmir State with distinct geographical outlook is having three agro climatic zones of Jammu, Kashmir and Ladakh, each zone having its own particular climatic character that describes its cropping pattern and productivity⁵. Agriculture is the mainstay of J&K and it is the main source of income and employment for the majority of population in the state. Nearly 70 per cent of the population in the state derives their livelihood directly or indirectly from agriculture sector. The

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average land holding in the state is (0.67 ha) and majority of the farmers (78 per cent) in the state are marginal having less than 1ha land holding. Irrigation is the artificial application of water to the land or soil. Irrigation is an essential input of agriculture and is practiced in all parts of the world where rainfall does not provide enough ground moisture. The net area sown in the State during 2013-14 was 741 thousand hectares, whereas the gross area sown (total area sown under different crops) was 1160 thousand hectares and 41 per cent of the net sown area is irrigated by different sources and remaining area is rain fed. About 89 per cent of the net area irrigated is irrigated through canals while tanks, tubes wells and other means are also⁶. The agriculture development still provides a crucial foundation for growth in agricultural and non-agricultural sectors in view of its contribution towards labour employment⁷. Paddy and fruits are the main crops of Kashmir, followed by maize, oilseeds, pulses, vegetables, fodders and wheat. In Jammu region wheat is the predominant crop followed by maize, paddy, pulses, oilseeds, fodder, vegetables and other crops while in Ladakh, barley is the major cereal crop followed by wheat. State has also the honor amongst the world's few places where saffron is cultivated.

The agricultural processes of the region are directly controlled by the prevailing physical environmental conditions (temperature, precipitation, terrain, soil etc.) and the socio-cultural milieu (land tenancy, size of holding, technology, workforce, irrigation, power, roads, marketing, aspirations of the growers, etc.)⁸. Characterized with mountainous and undulating terrain and micro-level variations in temperature, precipitation and soils, the state of Jammu and Kashmir has a high degree of variations in cropping patterns, crop combination and crop diversification⁹. In the state of Jammu and Kashmir, 58 per cent of the area under agriculture is rain fed and remaining 42 per cent is irrigated. In the state 11.28, 92.72, 56.99 and 96.15 per cent area under rice, maize, wheat and barley, respectively is cultivated as rain fed crop which attributes to low productivity and production as compare to national yields¹⁰.

2. Objectives of the study

- To examine the advantages of modern technology on agriculture sector.
- To examine the disadvantages of modern technology on agriculture sector.

3. Methodology

The present study is based on primary data. Primary data has been collected from the field survey through interview schedule. On the basis of high agricultural production, five blocks from district Pulwama viz. Awantipora, Kakapora, Lassipora, Pampore and Pulwama blocks have been selected randomly from District. 60 respondents belonging to agriculture sector have been selected from each selected block, which amounts to 300.

4. Statistical Analysis

Collected information was analyzed with the help of Excel. The statistical techniques used in this study are Mean, Percentage and Henry Garrets Ranking Technique.

Mean: The mean is just the average. It is the sum of all your measurements, divided by the number of measurements. Here is what the formula looks like:

$$\bar{x} = \frac{1}{N} \sum_{i=1}^N xi = \frac{x_1 + x_2 + \dots + x_N}{N}$$

Garrett's ranking technique

The Garret ranks were calculated by using appropriate Garret Ranking formula, which is based on the Garret ranks, the garret value was calculated. The Garret tables and scores of each reason in table, and multiplied to records scores in table, finally by adding each row, the total Garret score were obtained.

$$\text{Percent Position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = Rank given for the i^{th} variable by the j^{th} respondent.

N_j = number of variables ranked by the j^{th} respondent.

5. Results and Discussion

Table 1.1: Sex of the Respondents

Sex	Frequency	Percentage
Male	289	96.3
Female	11	3.7
Total	300	100

Source: Primary Survey, Computed by Researcher.

An illustration of distribution of respondents based on sex is presented in table 1.1. It is obvious from the table that among the total respondents of 300, 289 respondents (96.3 percent) of the respondents are males and only 11 respondents (3.7 percent) of them are females. Therefore, it is clear that majority (96.3 percent) of the respondents are males.

Table 1.2: Age of the Respondents

Age (Years)	Frequency	Percentage
21– 30	59	19.7
31 – 40	63	21.0
41 – 50	75	25.0
Above 50	103	34.3
Total	300	100

Source: Primary Survey, Computed by Researcher.

An illustration about the age of respondents is presented in above table. It is clear from the table that among the total respondents of 300, 59 respondents (19.7 percent) of the respondents fall in the age group of 21-30 years, 63 respondents (21.0 percent) of them fall in the age group of 31-40 years, 75 respondents (25.0 percent) of them lie in the age group of 41- 50 years and 103 respondents (34.30 percent) of them fall in the age group of above 50 years. Therefore it is found that majority (34.30 percent) of the respondent's fall in the age group of above 50 years.

Table 1.3: Educational Qualification of the Respondents

Educational Qualification	Frequency	Percentage
Illiterate	124	41.3
Primary	75	25.0
Secondary	47	15.7
Higher Secondary	27	9.0
Graduation	16	5.3
Above Graduation	11	3.7
Total	300	100

Source: Primary Survey, Computed by Researcher.

Table 1.3 depicts the details about educational qualification of the respondents. It is obvious from the table that among the total respondents of 300, 124 respondents (41.3 percent) of them are illiterate, 75 respondents (25.0 percent) have attained primary education, 47 respondents (15.7 percent) have got secondary education, 27 respondents (9.0 percent) have higher secondary educational qualification, 16 respondents (5.3 percent) have acquired graduation and only 11 respondents (3.7 percent) have educational qualification of above graduation. Therefore, it is concluded that majority (41.3 percent) of the respondents are illiterate and only 3.7 percent have done above graduation.

Table 1.4: Land Size of the Respondents

Size of Growers	Frequency	Percentage
Marginal (Up to 10 Kanals)	190	63.30
Small (10 - 20 Kanals)	68	22.70
Medium (20 – 30 Kanals)	24	8.0
Large (Above 30 Kanals)	18	6.0
Total	300	100

Source: Primary Survey, Computed by Researcher.

Note: 20 Kanals = 1 Hectare

Table 4.28 presents the details about the composition of respondents based on the area under paddy cultivation. It is apparent from the obtained results that among the total respondents of 300, 190 respondents (63.30 percent) of them belong to the group of marginal farmers, 68 respondents (22.70 percent) belong to small farmers, 24 respondents (8.0 percent) are medium farmers and only 18 respondents (6.0 percent) belong to the group of large farmers. Therefore, it is found that majority (63.30 percent) of the respondents is marginal farmers and only 6.0 percent are large farmers. Thereby accepting our alternative hypothesis that “Majority of the respondents belong to medium group of farmers in the selected district”.

Table 1.5: Source of Irrigation

Irrigation	Frequency	Percentage
Canal	100	33.3
Bore Well	54	18.0
River / Spring / Stream	143	47.7
Rain fed	3	1.0
Total	300	100

Source: Primary Survey, Computed by Researcher.

Table 1.5 illustrates the details about the distribution of respondents based on their source of irrigation. It is evident from the obtained results that among the total respondents of 300, 100 respondents (33.3 percent) of them have irrigation facility of canals, 54 respondents (18.0 percent) have irrigation facility of bore well, 143 respondents (33.5 percent) have irrigation facility of river/spring/stream and only 3 respondents (13.3 percent) don't have access to any irrigation facility i.e. they are dependent on rainfall. Hence, it is found that majority (47.7 percent) of total respondents have irrigation facility of river/spring/stream.

Table 1.6: Use of Technology

Technology Use	Frequency	Percentage
Modern	160	53.30
Traditional	1	0.30
Both	139	46.30
Total	400	100

Source: Primary Survey, Computed by Researcher.

Table 1.6 exhibits the details about the composition of respondents based on use of technology. It is obvious from the table that among the total respondents of 300, 160 respondents (53.30 percent) of them use modern technology, 1 respondent (0.30 percent) use traditional technology and 139 respondents (46.30 percent) of them are using both types of technologies. Therefore, it is concluded that majority (53.30 percent) of the respondents are using modern technology.

Table 1.7: Reasons for using modern technology

Reasons	Frequency	Percentage
Increases Productivity	203	67.70
Easy Farming	47	15.70
Time Saving	50	16.70
Total	300	100

Source: Primary Survey, Computed by Researcher.

Table 1.7 exhibits the details about the reasons for using modern technology by respondents. It is apparent from the obtained results that among the total respondents of 300, 203 respondents (67.70 percent) of them use modern technology because it increases productivity, 47 respondent (15.70 percent) use modern technology because of easy farming and 50 respondents (16.70 percent) of them use modern technology because it is time saving. Therefore, it is concluded that majority (67.70 percent) of the respondents are using modern technology because it increases productivity.

Advantages/ Disadvantages of modern technology

This section deals with the identification of the advantages and disadvantages of modern technology on agriculture. For the identification of the major advantages and disadvantages, the respondents were requested to assign rank to the factor according to the magnitude of the factor. To identify the major advantages and disadvantages Garrett's ranking technique was adopted. In this technique, the order of merit assigned by respondents were converted into score values by using the following formula:

$$\text{Percent position} = \frac{100 (R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = Rank given for the i^{th} factor by j^{th} respondents

N_j = Number of factors ranked by j^{th} respondents.

The percent position of each ranked factor thus obtained was converted into scores using Garrett's ranking table. Then the scores of all respondents for each factor were added together and divided by the total number of respondents (300) experiencing that particular problem. The mean scores of each factor thus arrived at, were assigned ranks and inferences were drawn. The factor having highest average score is considered to be the most important advantage/disadvantage.

Advantages

The ranking of advantages of modern technology on agriculture in the study area given by respondents is shown in table 1.8 a.

Table 1.8 a: Ranking of Advantages of Modern Technology on Agriculture given by Respondents

Advantages	Ranks given by respondents				
	1 st	2 nd	3 rd	4 th	5 th
It increased the price and demand of products	76	65	59	53	47
It increased my farm productivity	79	91	57	37	36
Time saving	87	78	42	51	42
Decreases the use of water and fertilizers	39	43	58	71	89
Better marketing and exposure to the price	19	23	84	88	86

1.8 b: Percent Position and Garret value

$100 (R_{ij} - 0.5) / N_j$	Calculated Value	Garret Value
$100 (1-.05) / 5$	10	75
$100 (2-.05) / 5$	30	60
$100 (3-.05) / 5$	50	50
$100 (4-.05) / 5$	70	40
$100 (5-.05) / 5$	90	25

Table 1.8 c: Calculation of Garret Value and Ranking

Advantages	1 st	2 nd	3 rd	4 th	5 th	Total	Average Score	Rank
It increased the price and demand of products	5700	3900	2950	2120	1175	15845	52.82	3
It increased my farm productivity	5925	5460	2850	1480	900	16615	55.38	1
Time saving	6525	4680	2100	2040	1050	16395	54.65	2
Decreases the use of water and fertilizers	2925	2580	2900	2840	2225	13470	44.90	4
Better marketing and exposure to the price	1425	1380	4200	3520	2150	12675	42.25	5

Source: Primary Survey, Computed by Researcher.

The calculation of Garret value and ranking of advantages of modern technology on agriculture in Pulwama district of Jammu and Kashmir is presented in the table 1.8 c. It is obvious from the obtained results that the major advantage of modern technology on agriculture is increase in farm productivity and holds the first rank with average score of 55.38. Time saving holds the second

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rank with average score of 54.65 followed by increase in price and demand of products (52.82), decreases the use of water and fertilizers (44.90) and the least advantage of modern technology on agriculture is better marketing and exposure to the price with average score of 42.25. Thereby accepting our hypothesis that “increase in productivity is the major advantage of modern technology on agriculture”.

Disadvantages

The ranking of disadvantages of modern technology on agriculture in the study area given by respondents is shown in table 1.9 a.

Table 1.9 a: Ranking of Disadvantages of Modern Technology on Agriculture given by Respondents

Disadvantages	Ranks given by respondents				
	1 st	2 nd	3 rd	4 th	5 th
Farmers are unable to use it	82	59	57	55	47
Increases input-cost	77	81	61	41	40
Decreases employment opportunities	71	89	39	53	48
Increases maintenance cost	47	50	58	65	80
Reduces fertility of the soil	23	21	85	86	85

1.9 b: Percent Position and Garret value

$100 (R_{ij} - 0.5) / N_j$	Calculated Value	Garret Value
$100 (1 - .05) / 6$	8.33	77
$100 (2 - .05) / 6$	25.00	63
$100 (3 - .05) / 6$	41.67	54

100 (4-.05) /6	58.33	46
100 (5-.05) /6	75.00	37
100 (6-.05) /6	91.67	23

Table 1.9 c: Calculation of Garret Value and Ranking

Disadvantages	1 st	2 nd	3 rd	4 th	5 th	Total	Average Score	Rank
Farmers are unable to use it	6150	3540	2850	2200	1175	15915	53.05	3
Increases input-cost	5775	4860	3050	1640	1000	16325	54.42	1
Decreases employment opportunities	5325	5340	1950	2120	1200	15935	53.12	2
Increases maintenance cost	3525	3000	2900	2600	2000	14025	46.75	4
Reduces fertility of the soil	1725	1260	4250	3440	2125	12800	42.67	5

Source: Primary Survey, Computed by Researcher.

The calculation of Garret value and ranking of disadvantages of modern technology on agriculture in Pulwama district of Jammu and Kashmir is presented in the table 1.9 c. It is apparent from the obtained results that the major disadvantage of modern technology on agriculture is increase in input cost and holds the first rank with average score of 54.42. Decreases employment opportunities holds the second rank with average score of 53.12 followed by farmers are unable to use it (53.05), increases maintenance cost (46.75) and the least disadvantage of modern technology on agriculture is that it reduces fertility of the soil with average score of 42.67.

6. Conclusion

Agriculture plays a very prominent role for development of economy of J&K State. Jammu and Kashmir State with distinct geographical outlook is having three agro climatic zones of Jammu, Kashmir and Ladakh, each zone having its own particular climatic character that describes its cropping pattern and productivity. Agriculture is the mainstay of J&K and it is the main source of income and employment for the majority of population in the state. Nearly 70 per cent of the population in the state derives their livelihood directly or indirectly from agriculture sector. In the state of Jammu and Kashmir, 58 per cent of the area under agriculture is rain fed and remaining 42 per cent is irrigated. In the state 11.28, 92.72, 56.99 and 96.15 per cent area under rice, maize, wheat and barley, respectively is cultivated as rain fed crop which attributes to low productivity and production as compare to national yields²¹. The traditional system of farming is in the process of transformation to modern agriculture which itself is undergoing through rapid changes. It has added a new dimension to agriculture. The role of credit in traditional agriculture is quite different from its role in modern agriculture. The traditional agriculture is defined as subsistence farming in which production activities take place for their own consumption. In the modern agriculture, agricultural sector becomes fully commercialized and the farmer produces for the market with profit motive.

It is found from the study that 53.30 percent of them use modern technology and 0.30 percent use traditional technology. Furthermore, it is found that, among the total respondents 67.70 percent of them use modern technology because it increases productivity, 47 15.70 percent use modern technology because of easy farming and 16.70 percent of them use modern technology because it is time saving. It is found from the study that the major advantage of modern technology on agriculture is increase in farm productivity followed by time saving and increase in price and demand of products and the major disadvantage of modern technology on agriculture is increase in input cost followed by decreases employment opportunities and farmers are unable to use it.

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